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EXAMINER

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/660,186  
Filing Date: September 11, 2003  
Appellant(s): BECKLEY ET AL.

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Carl P. Hemenway  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed October 20, 2009 appealing from the Office action mailed May, 21, 2009.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

5,959,028	Irie et al.	9-1999
6,521,716	Leake, Jonathan Stuart	2-2003
2003/0165701	Straw, Thomas Allen	9-2003

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 1-6, 11-13, 15, 16, 18-20, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Irie et al. (U.S. Patent 5,959,028) in view of Straw (U. S. Patent Application Publication 2003/0165701).

Irie discloses a resin composition curable through a Michael reaction between (a) a component having a plurality of  $\alpha$ ,  $\beta$ -unsaturate carbonyl groups and (b) a component having a plurality of activated methylene group in the presence of a catalyst is disclosed. The activated methylene component is a polymer of an asymmetric malonate ester in which one of carboxyl groups is esterified with an alkanol while the other carboxyl group is esterified with hydroxyalkyl (meth) acrylate or polyoxyalkylene glycol mono(meth)acrylate (abstract).

With regard to the limitations of claims 1-6 and 11-20, Irie discloses curable resin composition comprising:

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(a) a component containing a plurality of  $\alpha,\beta$ -ethylenically unsaturated carbonyl groups in the molecule;

b) an acrylate polymer containing a plurality of malonate-terminated pendant groups in the molecule; and

(c) a catalyst capable of promoting the Michael reaction (col. 2, lines 10-15).

Component (a) is a compound or polymer having a plurality of ethylenic unsaturations between carbon atoms at  $\alpha$  and  $\beta$  positions relative to a carbonyl group. Typical examples of such compound are acrylic or methacrylic (hereinafter collectively referred to as "(meth) acrylic") esters of polyhydric alcohols such as ethylene glycol di(meth)acrylate, diethylene glycol di(meth) acrylate, propylene glycol di(meth)acrylate, neopentyl glycol di(meth)acrylate, trimethylolpropane tri(meth) acrylate, glycerol tri(meth)acrylate, pentaerythritol tetra(meth)acrylate and the like.

Further examples of component (a) include polyether acrylate resins such as polyethylene glycol di(meth) acrylate, etc. (col. 3, lines 30-33).

When component (a) is a resin, its molecular weight ranges between 400 and 100,000, preferably between 600 and 10,000, and the alkenyl equivalent weight ranges between 100 and 10,000, preferably between 100 and 1,000, which is within the claimed range (col. 3, lines 36-39).

Component (b) may be produced by copolymerizing a malonate-terminated acrylate monomer with a copolymerizable acrylic and/or non-acrylic monomer as exemplified in connection with component (a) (col. 3, lines 44-47). The malonate-

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terminated acrylate monomers have the formula, which is substantially identical to formulas in claim 12 (col. 3, lines 52-57).

Examples of copolymerizable acrylic monomers include alkyl (meth)acrylates such as methyl, ethyl, propyl, n-butyl, isobutyl, t-butyl, 2-ethylhexyl or lauryl (meth)acrylate; hydroxyalkyl (meth)acrylates such as 2-hydroxyethyl (meth)acrylate; aryl or aralkyl (meth)acrylates such as phenyl or benzyl (meth)acrylate; and other acrylic monomers such as acrylamide, methylene-bis-acrylamide or acrylonitrile. Examples of copolymerizable non-acrylic monomers include styrene,  $\alpha$ -methylstyrene, itaconic acid, maleic acid, vinyl acetate and the like (col. 4, lines 4-13).

Component (c) of the resin composition of the present invention may be a strong base. Examples thereof include alkali metal hydroxide such as sodium hydroxide or potassium hydroxide; alkali metal alkoxide such as sodium methoxide or potassium ethoxide; quaternary ammonium hydroxides such as tetrabutylammonium hydroxide, etc. (col. 4, lines 25-30).

The proportions of component (a) and component (b) in the curable resin composition of the present invention generally lie between 2:1 and 1:2, preferably between 1.5:1 and 1:1.5 relative to the double bond and the activated methylene to be added thereto. The proportion of component (c) may range generally between 0.1 and 10.0 equivalent %, preferably between 0.2 and 5.0 equivalent % based on the sum of component (a) and component (b), which are within the claimed ranges (col. 6, lines 11-18).

With regard to the limitations of claims 1 and 21-24, Irie does not disclose that the curable mixture comprises 5% or less by weight non-reactive volatile compounds.

Straw discloses that the coating composition need have little or no volatile organic solvent to achieve a viscosity suitable for spray application (page 1, [0003]). Straw discloses that the volatiles should be removed, for instance under vacuum (page 4, [0039]).

Both references are analogous art because they are from the same field of endeavor concerning curable Michael addition compositions.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made employ little or no volatile compounds as taught by Straw in Irie's resin composition curable through a Michael reaction in order to achieve a viscosity suitable for spray application (US'701, page 1, [0003], page 4,[0039]), and thus to arrive at the subject matter of instant claim 1 and dependent claims 22-24.

In the absence of showing criticality in the specification of maintaining the amount of 2% or less by weight non-reactive volatile compounds, based on the total amount of curable mixture, it is the examiner position to believe that the combined Irie's and Straw's curable mixture characterized by exactly the same reactive equivalent ratio and the same compounds, such as multi-functional Michael donor, multi-functional Michael acceptor and an anion of a Michael donor, each of them has molecular weight within the claimed ranges, would be substantially identical to the instant claimed curable mixture.

It is worth mentioning that Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results.

2. Claims 21, 25 and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Irie et al. (U. S. Patent 5,959,028) and Straw (U. S. Patent Application Publication 2003/0165701) as applied to claims 1-6, 11-20 and 22-24 above and further in view of Leake (U. S. Patent 6,521,716).

The disclosure of Irie's and Straw's references resided in § 1 is incorporated herein by reference.

With regard to the limitations of claim 21, that the combined Irie's and Straw's teaching does not disclose that the curable mixture does not contain any of the catalysts usually used for Michael addition reactions.

Leake discloses that the reaction mixture in Michael reaction becomes less polar during curing, and in a coating the affinity for water should consequently decrease as curing progresses. In some cases, a water-soluble polymer/crosslinker system can be transformed into a water-resistant cured coating upon crosslinking. There is, however, need for Michael curing coatings, which cure more rapidly, particularly at ambient



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temperature, and/or are capable of curing without the need for powerful alkaline catalysts (col. 1, line 67 through col. 2, line 9). Leake exemplifies that PPDIDC and EEMTCH were cured without catalyst under the conditions described in Example 25 and formed a tack-free film in 48 hours (Example 26, col. 32, line 50 through col. 33, line 15).

All these references are analogous art because they are from the same field of endeavor concerning new coating resin composition curing by Michael addition reaction.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the curing without the need for powerful catalysts as taught by Leake in combined Irie's and Straw's curable resin composition for coating in order to obtain Michael curing coating which cure more rapidly, particularly at ambient temperature (US'716, col. 2, lines 5-8), and thus to arrive at the subject matter of instant claim 21.

With regard to the limitations of claim 25, the combined teaching of Irie and Straw is silent that the curable mixture does not contain any of the catalysts usually used for Michael addition reactions.

With regard to the limitations of claim 25, Leake discloses that the reaction mixture in Michael reaction becomes less polar during curing, and in a coating the affinity for water should consequently decrease as curing progresses. In some cases, a water-soluble polymer/crosslinker system can be transformed into a water-resistant cured coating upon crosslinking. There is, however, need for Michael curing coatings, which cure more rapidly, particularly at ambient temperature, and/or are capable of

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curing without the need for powerful alkaline catalysts (col. 1, line 67 through col. 2, line 9). Leake exemplifies that PPDIDC and EEMTCH were cured without catalyst under the conditions described in Example 25 and formed a tack-free film in 48 hours (Example 26, col. 32, line 50 through col. 33, line 15).

All these references are analogous art because they are from the same field of endeavor concerning new coating resin composition curing by Michael addition reaction.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the curing without the need for powerful catalysts as taught by Leake in combined Irie's and Straw's curable resin composition for coating in order to obtain Michael curing coating which cure more rapidly, particularly at ambient temperature (US'716, col. 2, lines 5-8), and thus to arrive at the subject matter of instant claim 25.

With regard to the limitations of claim 26, Irie discloses curable resin composition comprising: (a) a component containing a plurality of  $\alpha,\beta$ -ethylenically unsaturated carbonyl groups in the molecule; b) an acrylate polymer containing a plurality of malonate-terminated pendant groups in the molecule; and (c) a catalyst capable of promoting the Michael reaction (col. 2, lines 10-15).

Component (b) may be produced by copolymerizing a malonate-terminated acrylate monomer with a copolymerizable acrylic and/or non-acrylic monomer as exemplified in connection with component (a) (col. 3, lines 44-47). The malonate-terminated acrylate monomers have the formula, which is substantially identical to formulas in claim 12 (col. 3, lines 52-57). Therefore, component (b) corresponds to the

claimed multi-functional Michael donor and accordingly to the claimed anion of Michael donor.

#### **(10) Response to Argument**

1. It appears that the focal arguments of Applicants are that the Declaration of Mr. M. Chen resides in the contention that Straw's paragraph #39 teaches removal of the volatile reaction medium from the specific Michael acceptor; Straw's paragraph #39 does not teach removal of volatiles from the curable composition (page 9, 2<sup>nd</sup> paragraph). Furthermore, Applicants contends that Straw teaches that his compositions are "water borne", and in the examples the weight percent water in the curable composition are 27.5% or more by weight of water (page 10, the last paragraph).
2. It is noted that instant claim 1 recites the limitation "...wherein said curable mixture comprises 5% or less by weight non-reactive volatile compounds that have boiling points of 120°C or less". The specification discloses the following: "It is preferred that the curable mixture that contains multi-functional Michael donor, multi-functional Michael acceptor, and anion of a Michael donor is substantially free of volatile nonreactive compounds. In other embodiments, it is preferred that the reaction products of the reaction between the multi-functional Michael donor and the multi-functional Michael acceptor be substantially free of volatile nonreactive compounds. In some embodiments, both the mixture and the products are substantially free of volatile nonreactive compounds "(page 12, lines 1-7). It was also mentioned in the specification that remaining volatiles (ethanol, acetone, excess ethyl acetoacetate) were removed

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(examples 1, 3, 11, and 17) from specific Michael donors; the disclosure does not exemplifies the removal of volatiles from the curable composition. Therefore, Straw's paragraph #39 does not contradict the disclosure, but, to the contrary, fully matches it.

The Declaration confirms that Straw clearly discloses removal of the volatile reaction medium from the specific Michael ingredients, which fully corresponds to the above mentioned examples of the specification.

Furthermore, Irie discloses that when used as a coating composition, it may contain a variety of conventional additives such as extender pigments, coloring pigments, sag-preventing agents, UV absorbers and the like. After applying onto a substrate as a film, the composition may be cured, depending upon the type of catalyst, by leaving at ambient temperature or baking the film at a temperature between 100<sup>0</sup>C and 200<sup>0</sup>C, preferably between 120<sup>0</sup>C and 150<sup>0</sup>C (col. 6, lines 33-41). Straw discloses that all ingredients are added to the reactor and the mixture is heated to 120<sup>0</sup>C for 2 hours. The volatiles are then stripped under the reduced pressure at 120<sup>0</sup>C (page 6, [0065]). The coating was cured dry at 105<sup>0</sup>C for 20 minutes to give a hard dry film (page 6, [0073]).

Therefore, it is the examiner's position that under such high temperatures and long duration of time in both Irie and Straw' curable resin compositions the most (if not all) volatile solvent having boiling points of 120<sup>0</sup>C or less, as per newly amended claim 1, would be successfully removed from the curable mixture and also from the products.

As it was already mentioned in the previous Office actions dated on January 9, 2009, and May 21, 2009, in the absence of showing criticality in the specification of

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maintaining the amount of 2% or less by weight non-reactive volatile compounds, based on the total amount of curable mixture, it is the examiner position to believe that the combined Irie's and Straw's curable mixture characterized by exactly the same reactive equivalent ratio and the same compounds, such as multi-functional Michael donor, multi-functional Michael acceptor and an anion of a Michael donor, each of them has molecular weight within the claimed ranges, would be substantially identical to the instant claimed curable mixture; therefore the Examiner assumes that these curable resin compositions (Irie, Straw, and the claimed invention) having substantially identical intended use (coating, etc.) would be substantially free of volatile non-reactive compounds.

Furthermore it is worth to repeat again that Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP § 716.02 - § 716.02(g) for a discussion of criticality and unexpected results.

3. In response to the arguments against Irie's reference that it would not be obvious to a person of ordinary skill in the art to design a high-solids coating by simply removing the solvent from Irie's composition (pages 8-10), it is noted as it was mentioned in the Declaration (pages 3-4, [0013], [0014]), Irie' curable resin composition is substantially

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identical to the claimed composition and it contains substantially identical ingredients.

Therefore, it is the Examiner's position that one having ordinary skill in the art could successfully design a high-solids coating by simply removing the solvent from Irie's composition.

4. The Applicants contend that, according the Declaration of Mr. M. Chen, Straw does not teach or suggest using compositions that are not water borne. That is, Straw teaches compositions that have more than 5% water by weight, and water is a non-reactive volatile compound (as defined in the present claims). Therefore Straw does not teach or suggest any composition with 5% or less of non-reactive volatile compounds; Irie, like Straw, fails to teach or suggest using compositions with 5% or less non-reactive volatile compounds (pages 10-14).

5. It is noted that the first reference of Irie (U.S. Patent 5,959,028) exemplifies that the curable mixture comprises 5% or less by weight non-reactive volatile compounds (Example 31). The second reference of Straw (U. S. Patent Application Publication 2003/0165701) is used ONLY for recitation of common knowledge that coating compositions curable by Michael reaction have several advantages. Liquid polymers and oligomers can be cross-linked to form tough hard coatings, so that the coating composition need have little or no volatile organic solvent to achieve a viscosity suitable for spray application (page 1, [0003]), and it is not important that the Straw composition itself is water-born. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made employ little or no volatile compounds as taught by Straw in Irie's resin composition curable through a Michael reaction in order to

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achieve a viscosity suitable for spray application (US'701, page 1, [0003], page 4, [0039]).

6. In response to applicant's argument regarding the rejection of claims 21, 25 and 26 under 35 U.S.C. §103(a) as being unpatentable as obvious over Irie in view of Straw and further in view of Leake (U. S. Patent 6,521,716) (pages 15-19), it is noted that as it was already mentioned in the previous Office action dated on May 21, 2009, the reference is analogous art because it is from the same field of endeavor concerning new coating resin composition curing by Michael addition reaction. It is further noted that "The motivation in the prior art to combine references does not have to be identical to that of the applicant to establish obviousness, i.e. it is not required for a finding of obviousness that motivation of the skilled artisan be the same as an applicant motivation", *In re Kemps*, 97 F.3d 1427, 1430, 40 USPQ2d 1309, 1312 (Fed. Cir. 1996) (holding there is sufficient motivation to combine teachings of prior art to achieve claimed invention where one reference specifically refers to the other).

Therefore, it is well settled that for a finding of obviousness under §103 the prior art need not disclose the same motivation as disclosed by an applicant.

#### **(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

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For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Michael M. Bernshteyn

/Michael M. Bernshteyn/

Examiner, Art Unit 1796

Conferees:

/David Wu/

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